CLAIMS

What is claimed is:

1. An opto-electronic device having a first cladding layer separated from a second cladding layer by an active layer, said device comprising:

a ridge waveguide formed from at least a portion of the top cladding layer, said ridge waveguide having a ridge top surface deposited from the active layer by a first distance; and

at least one semiconductor mesa fashioned from a protective layer separate from the top cladding layer, said at least one semiconductor mesa having a mesa top surface deposited from the active layer by a second distance greater than said first distance so that said at least one semiconductor mesa shields said ridge waveguide from mechanical damage.

2. The device as recited in claim 1, wherein said ridge waveguide is displaced between a first channel and a second channel.

3. The device as recited in claim 1, further comprising a metal contact deposited over at least a portion of said ridge waveguide.

4. The device as recited in claim 3, wherein said ridge waveguide in combination with said metal contact has a distance from the active layer less than said second distance.

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5. The device as recited in claim 1, wherein said semiconductor mesa comprises InP.

6. The device as recited in claim 1, wherein said protective layer is deposited from the top cladding layer by an etch stop layer.

7. The device as recited in claim 1, wherein the opto-electronic device is a device selected from the group consisting of a Fabry-Perot laser, a DFB laser, an optical modulator, and a semiconductor optical amplifier.

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8. A semiconductor laser grown on a substrate, the laser comprising:

a semiconductor laser wafer having an active layer, at least two optical cladding layers, and a ridge waveguide, said ridge waveguide having a ridge top surface deposited from a first surface of said semiconductor laser wafer by a first distance;

a plurality of semiconductor mesas formed on said semiconductor laser wafer, said plurality of semiconductor mesas being separate from said at least two optical cladding layers and having a mesa top surface disposited from said first surface by a second distance greater than said first distance so that said plurality of semiconductor mesas shield said ridge waveguide from mechanical damage.

9. The laser as recited in claim 8, wherein at least a portion of said ridge waveguide is coated with a metal contact.

10. The laser as recited in claim 9, wherein said ridge waveguide in combination with said metal contact has a third distance from said first surface less than said second distance.

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11. The laser as recited in claim 9, wherein said metal contact has a thickness of less than about one micron.

12. The laser as recited in claim 8, wherein said second distance is at least 0.5 micron greater than said first distance.

13. The laser as recited in claim 8, wherein at least one of said plurality of semiconductor protective layer has a thickness of between about 1.5 microns and 3.0 microns.

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14. A laser die having an active layer deposited between a first cladding layer and a second cladding layer, the laser die comprising:

a highly doped semiconductor contact layer deposited on the first cladding layer;

a ridge waveguide contacting said contact layer and a metal contact layer formed on said contact layer, said ridge waveguide having a ridge top surface deposited from a first surface of the laser die by a first height; and

at least one semiconductor mesa formed on said contact layer, said at least one semiconductor mesa extending a distance above a top surface of said metal contact to form an elevated surface shielding said ridge from mechanical damage.

15. A laser die as recited in claim 14, wherein said at least one semiconductor mesa is InP.

16. A laser die as recited in claim 14, wherein the first cladding layer and the second cladding layer, comprises materials selected from the group consisting of III-V semiconductor material.

17. A laser die as recited in claim 14, wherein said elevated surface is elevated from said metal contact layer deposited on said ridge waveguide by at least about 0.5 micron.

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18. A laser die as recited in claim 14, wherein an upper surface of said ridge waveguide contacts said contact layer.

19. A laser die as recited in claim 14, wherein the die has a peripheral edge and said contact layer terminates proximal to said peripheral edge of the laser die.

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20. A method of protecting a ridge waveguide of an opto-electronic device, the method comprising:

a step for forming a wafer having a semiconductor layer sequence that includes an active layer, a top clad layer, an etch-stop layer, and a semiconductor protection layer grown on said etch-stop layer;

a step for forming a first semiconductor mesa and a second semiconductor mesa in said wafer; and

a step for forming a ridge waveguide between said first semiconductor mesa and said second semiconductor mesa, wherein said first semiconductor mesa and said second semiconductor mesa are positioned and have a surface height sufficiently greater than a surface height of said ridge waveguide to form an elevated surface shielding said ridge waveguide from mechanical damage

21. The method as recited in claim 20, wherein said step for forming said first semiconductor mesa and said second semiconductor mesa further comprises:

a step for masking said wafer to expose regions in which ridge lasers are to be formed; and

a step for etching said protection layer in unmasked regions to form said first semiconductor mesa and said second semiconductor mesa above an etched region.

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22. A method as recited in claim 20, wherein forming said ridge waveguide further comprises a step for etching said top clad layer between said first semiconductor mesa and said second semiconductor mesa.

23. A method as recited in claim 22, wherein said step for etching comprises a step for etching said top clad layer to within about 0.17 micron of said active layer.

24. A method as recited in claim 20, further comprising a step for applying a metal contact layer to at least a portion of said ridge waveguide.

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